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ABSTRACT

Jill Paton Walsh's "The Green Book," the story of a group of humans and their life on a new planet, captures the imagination of learners and provides a compelling context for learning. Several groups of learners including fifth graders and adult teacher practitioners responded to the book in unique and interesting ways. As the setting, the motivations of the characters, and the scientific and logistic credibility of the story were pondered by the students the story grew richer and more meaningful for them. The power of stories, as seen through the responses to "The Green Book," is that they: help learners remember, parallel real life, foster meaning making, provide a meaningful context, accommodate individual differences, and invite learners into a community. The keeping of a community's story--the preservation of culture begun in a blank book brought from Earth by a child--is the essence of "The Green Book." (Contains 19 references.) (RS)

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The Power of Story in Science Learning

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The Power of Story in Science Learning

The Green Book (Walsh, 1982, summarized)

Father said "We can take very little with us." The instructions allowed only one personal item and one book per voyager on their escape from the dying blue Earth. Pattie took a dark green book with gold tooling. It had flowery end pages and a creamy silk ribbon to mark the place. Its pages were quite empty. Her siblings, Joe and Sarah, and all the others ridiculed Pattie about her choice because it was the games and books that filled the long silences of space travel to their new world.

After many months of anticipation, the travelers embarked upon the planet. It was a land of lakes and craggy glittery rocks--a beautiful silent land of symmetrical snow-topped mountains shining silver and gray. Pattie, the youngest, was given the privilege of naming the new world. She christened it "Shine."

As the space pioneers explored Shine, they soon discovered the crystalline nature of every aspect of the planet. The grass and plants cut their feet and the plants and trees seemed to be made of glass and were unlike those on Earth. Father invented a way of using the trees by melting and splitting the wood to form a hut. The children discovered candy-like tree sap, green jellyfish-like creatures in the lake, and the curious Boulder Valley of the moth people.

Life on Shine was unsure because their source of food was uncertain. They had tried to raise the rabbits they had brought by feeding them the plants of Shine, but the crystalline nature of the tissue killed every animal. Nothing would grow in the vegetable patches. It seemed that they would surely die of starvation if their primary crop, wheat, failed.

Father was instrumental in their planting of the crop. Using the book on intermediate technology that had been his selection to take to the new world, Father had set his function as contriver of machines and now had a vital role in the fledgling society. At first the wheat grew green and tall. There was great hope in the community that they might yet be saved from starvation. When the wheat started to mature, however, the grains had become crystalline like everything else on Shine. Not desiring to end in a fate similar to the rabbits, the people Shine were prepared to take their pills of last resort.

Pattie and Sarah, however, decided to try. They ground a stolen handful of wheat, added water, made a dough, rolled out a thin pancake, cooked it over the fire, and ate it. Father was alarmed when he discovered their folly and was prepared to see both children meet the same fate as their rabbits. Instead, the children awoke the next morning feeling quite well and the community was saved.

As the group prepared for the winter, they had a need to record the division of the shares of food. Father sent Joe to get Pattie's blank book despite her protests. When he opened it he discovered it was filled with large, round, shaky writing which everyone begged him to read. Father began in a surprised voice: "Father said, 'We can take very little with us.'"

Responses to the Book

We apologize to Jill Paton Walsh for abstracting her wonderful book. Ideally each of the readers of this text will read *The Green Book* in its entirety. In lieu of the entire book or a particular segment of the book we offer the summary to highlight the setting, characters, action and dilemmas of the story. As you reflect on the story, what interests you? What would you like to know more about? What might you do to satisfy those interests or questions?

We have offered this text to several groups of learners. Fifth graders to adult teacher practitioners respond in unique and interesting ways. The fifth graders were interested in why the earth was dying, why it was going blue. They wanted to know when the book was supposed to have taken place, about rocket travel and the length of the journey. The jellyfish were of particular interest. "Will a jellyfish really burn like that," one boy asked. Eating the glass-like particles stimulated much interest, "Could you eat anything that is crystalline and live?" Our adult learners were equally fascinated by several possibilities in the book:

Where are they going?
Why could they not take much?
What was the disaster?
Why did so many bring Robinson Crusoe and no one thought to bring Shakespeare?
What happened to mother?
What were their ages? What was the population of Earth?
Why no wind?
No clouds yet rain? How?
Why did it get dark so quickly?
What will the "pill" do?
What is a rivulet? treacle?
How could crystalline plant life exist?

What kind of life cycle did the moth people have?
What was the function of the guide?

Dozens more questions and puzzles were spawned during the reading and discussion of the book. After the questions, actions often followed. Child and adult alike have pursued their posed questions by thinking, discussing, researching, and experimenting. A sampler of the kinds of inquiry made possible by this introduction of story have been:

drawings based on interpretations of text descriptions of land forms and scenery of Shine,

discussions about the kinds of books and/or personal items one might take on a journey such as this,

observations on meal worms as possible parallels to the moth people in the story, and

experimentation with dance as a way of communicating information and feeling.

Members of one of our adult classes were particularly interested in the area of "intermediate technology", the role of contriver, and the kinds of contrivances that might be made from materials available to the Shine pioneers. As a result of their interests they collected all sorts of discarded items and began planning and experimenting to make items useful to an emerging society. An amazing array of contrivances were made and demonstrated: jellyfish collecting nets made from plastic berry containers, water purification apparatus and hydroponic gardens from plastic sheets and wooden supports, simple looms made of cardboard and string for weaving moth wings into cloth, games, weapons, tools, and ornaments.

The interests of the learners were motivated by the story and the story was made richer in the process. As the setting, the motivations of the characters, the scientific and logistic credibility of the story were pondered, the story grew richer and more meaningful. *The Green Book* grabbed the interest of our learners. They wanted to know more about the people of Shine, about Pattie, about Sarah and Joe. They wanted to know how the planet worked. They wanted to know what would happen next. The story had entertained, but had also done something more. The story had captured the imagination of the readers and activated them to consider possibility. The story was a compelling context for learning.

Why story?

So, why story? What makes *The Green Book*, or for that matter, any good and true story[1] so special? Why can we pull strings of meaning from

[1] "True story" as used in this chapter refers to the structure of the text, not the authenticity of the content.

story? Why does story provide a compelling context for learning?

To remember. Humans are storytelling organisms who individually and socially lead storied lives. Stories are fundamental structures of the human experience dating back to preliterate cultures and still retained as a primary mode of modern communication. Storytelling and the storyteller are fixtures of both the past and the present.

The function of the storyteller in preliterate cultures was to perpetuate culture and community memory of the history and ethos of a people. Patriarchal stories of the Old Testament, for example, were orally transmitted for centuries before scribes ever put quill to scroll. The stories, parables, and allegories of the Hebrews and the stories of other ancient cultures contained the elements of belief systems, historical records, and common culture. Stories provided the vehicle for communication of law, religion, ethics, and values. As containers of information, stories provided early cultures efficient ways of remembering complex concepts and systems.

In a metacognitive way, story provides a structure for remembering. For example, aboriginal peoples of Australia know nothing of maps. Instead they tell stories rich with place names and their positions. By knowing the story one has a verbal map of the relationship of each place to other places. To know the story meant that you had a means of finding your way over the land. To not know the stories is quite literally to be lost. Story is an important metacognitive organizer for information--a pattern which the brain can easily recognize and can then layer specifics upon.

To parallel life. Each of our lives is a story, a living narrative of our existence. Physician and poet William Carlos Williams talks about the lives of his patients by saying, "Their story, yours, mine--it's what we all carry with us on this trip we take, and we owe it to each other to respect our stories and learn from them" (quoted in Coles 1989, 30). When we relate how we spent our summer vacation, how the fishing was, where we stayed, the people we met, we do it as story. True stories have real and believable characters that solve real problems, a pattern analogous to real life. Because of this parallel, "narrative structure allows children to identify with a character being propelled through a conflict that reaches a resolution" (Lauritzen, 1991). A visceral bonding occurs between ourselves and the characters. As the characters in the story are confronted with circumstances, trials, and epiphanies we share in their emotions: we triumph in victory, joy in accomplishment, fear in anticipation. We take ownership of their story as our story. In this way stories are easy for learners to understand because they are based a simple, understandable structure. Through stories, learners can experiences other lives vicariously and develop an awareness and understanding of their own lives in the process.

To make meaning. Stories provide learners a means for making meaning. They allow us to tell about things that we know either tacitly or consciously, to help us rediscover or reinvent our reality and thereby understand it more deeply and meaningfully. Bruner, in *Acts of Meaning* argues that narrative thinking brings the child into the arena of human culture. He says that it is narratives that give pattern and continuity to human experience and therefore stories are powerful instruments of learning. "I have wanted to make it clear," he says, "that our capacity to rend experience in terms of narrative is not child's play, but an instrument for making meaning that dominates much of life in culture" (Bruner, 1990, p. 97). Rosen (1986, p. 230) suggests that "narrative has an importance much deeper and broader than the purely literary values we customarily give to it and that it has a preeminence among the discourse options open to us [because]...it is a primary and irreducible form of human comprehension and it is the central instance or function of human mind."

Story gives us a framework for imposing order on what would otherwise be random events. Story becomes the container that enables us to discern how diverse elements hold together by organizing events into meaningful experiences. Story allows the learner to link isolated facts into connections that make sense, something that Calkins (1991, 185) says is critical for humans.

> ...for all of us, the life we're given amounts to "We had coke, and then we had a hot dog," The rest depends on what we make of it. Being human means we can remember and tell stories and pretend and write and hope and share, and in this way we add a growth rings of meaning to our lives. Being human means that in addition to going through the motions of our lives, we need to turn back and celebrate our lives. We need to paint and write and make believe and tell stories and represent and reminisce. We need to develop the eyes to see. What human beings fear most is not growing old, but growing old without things adding up.

Narratives are a way of making sense of reality and of the events the continually fill our lives (Erasmus, 1989).

True stories are based upon central themes, universal truths, or moral outcomes. These conceptual organizers help arrange the patterns of a literary piece in such a way to help readers construct the big ideas contained in and between the lines of the text. A story has the power to convey concept in powerful and meaningful ways. As Egan (1979, 120) states:

> Stories are the most effective tools for making their content meaningful. They are also effective ways of introducing the

> concepts of otherness by building into their structure notions of causality, logical relationships, the movement of time. The potential of fictional stories for clarifying the concepts of almost any curriculum area should not be underestimated or ignored.

Explaining who we are and how we function through narrative is evident in the words of a Native American medicine man:

> Too many of you don't know the stories, " he continues. You can't know certain things without them. I've done the chants for many years now.... The chants get results. I can't explain it to you. But the most important thing is that you have to know the stories, the legends, in order for the words and the rhythms to make sense, in order for you to know your language and your culture." (Brown, 1991, p. 89)

The stories and legends were the conceptual and spiritual organizers for the chants and healing rituals. Stories can provide learners with the same sort of organizational structure. Algorithms, processes, and streams of facts are like chants without a context, they simply don't work without the story to make meaning.

> Constructing stories in the mind --or storying , as it has been called--is one of the most fundamental means of meaning making; as such it is an activity that pervades all aspects of learning... Through the exchange of stories, teachers and students can share their understandings of a topic and bring their mental models of the world into closer alignment. In this sense, stories and storying are relevant in all areas of the curriculum. (Wells, 1986, p. 194)

To learn in a meaningful context. Each new reform initiative in education in the past decade has broached the words "meaningful context" in some manner or another. What is meant by this clarion call is the antithesis of decades of instruction. The curriculum has been split into bite-sized chunks that are easy to swallow but provide little nourishment: workbooks of spelling words and reading skills, math problems, science nomenclature, names, dates, people, places, events, facts, or as we like to call it, "stuff" curriculum. The "stuff" curriculum fails to motivate teacher or learner because it lacks connectededness between the parts.

The National Council of Teachers of Mathematics' Standards (NCTM,

1989), for example, are clear in their call to rearrange the piecemeal curricula. They require a curriculum for all that includes a broad range of content, a variety of contexts and deliberate connections. This is a vision of:

- Mathematical power for all in a technological society
- Mathematics as something one does to solve problems, communicate, reason
- A curriculum for all that includes a broad range of content, a variety of contexts and deliberate connections
- The learning of mathematics as an active, constructive process
- Instruction based on real problems
- Evaluation as a means of improving instruction, learning, and programs (Frye, 1989)

Math futurists see learning less as a set of arithmetic processes and procedures and more an ability to attack real world problems through authentic experiences--less drill and practice of algorithmic routes of dozens of similarly stated problems and more experimentation, observation, manipulation and interpretation of experience by use of mathematical tools. Beane (1991) includes in his key features of middle school curriculum a context in which meaning can be created by students. The need for a meaningful context has been one of the major justifications in the recent trend toward to integrated curriculum.

For the reasons stated in the previous section, story does provide a meaningful context for curriculum. Because story reflects the real world, the conflicts, dilemmas, puzzles, mysteries, and dramas depicted are authentic. One of our students, Garrick, said it well, "With narrative we take a piece of life and learn from it and that 's what we do everyday."

. *To accommodate individual differences.* Story has a unique charm in that it has the power to capture the entire spectrum of learners. A good story is a good story for all ages. For example, we have read *Galimoto* (Williams, 1990) to young children, middle grades, and adults. Each age group reacted to the text with interest. Young children were interested in Kondi's invention. They wanted to know what a galimoto was and what he would do with the wires. Middle grade students pressed the issue of where the story took place, why was Kondi using a shoe box and everyone looked barefoot, and what was life like in this village. Adult learners were no less intrigued by the book. Some were interested in the gender roles depicted by the book. Others wanted to know about the social relationships of the people introduced. *Galimoto* invited each learner to interact with the story at their level of ability and/or interest.

Since story can be approached from a variety of levels and intellectual and developmental abilities, it has opportunity for all to find a measure of

delight. Belinda, a local teacher utilizing story in her classroom, reported that although she had a very wide array of intellectual abilities demonstrated by her children, each was able to approach the book *The Great Kapok Tree* (Cherry, 1990) at their own level. Some asked very penetrating and conceptual questions such as "Will all of the animals die if the kapok tree is chopped down?" to very basic kinds of questions such as "What is a kapok tree?". Story invites learners whatever their academic or developmental station to stretch to inquire and explore the possibilities.

To join a community. Story provides a community with a common point of reference. Below are listed some phrases that are related to stories we know. See how many of them trigger a story for you.

Sour grapes
Tasks of Hercules
"I think I can"
Loaves and fishes
"To be or not to be"
"Call me Ishmael"
"The night Max wore his wolf suit and made mischief of one kind and another..."
Cannery row
"Listen, my children, and you shall hear..."

With each story that we share, we feel a closer relationship with each other. If we both know the same stories, we share much more than just the information contained in the pages of a book.

> Although storying may have its roots in the biologically given human predisposition to construct mental stories in order to make sense of perceptual information, it very quickly becomes the means whereby we enter into a shared world, which is continually broadened and enriched by the exchange of stories with others. (Wells, 1986, p. 196)

The community instills its truth through shared story and seeks understanding through examination and reexamination of the anthology. Barton and Booth (1990, p. 174) state it elegantly:

> But most of all, we sing the praises of story--that most simple and complex creation of all the arts, resonating from caves and echoing from the moons of distant planets. We are all part of the story tapestries of our tribes, our threads woven into yours, each tale embroidered with the strands of others, for all time.

The use of story to bind community is powerful, in a practical sense. Michael recounts an experience with science educators where story played a pivotal role in shaping a sense of community from one of disarray:

> There were almost fifty science educators from four states struggling with drafting a common statement of goals that all could agree. There were long discourses, bulleted lists, explanatory prose, miscommunication and heated debate. We were not of common purpose and were headed for four separate visions. I remembered a story that seemed to relate the key ingredients of the goals we were so desperately trying to communicate and asked the group if I could share it. In a few short moments of telling the story *Come Back Salmon* (Cone, 19 92), the group melted and then jelled as a community. Somehow the story of young children repairing a polluted stream, returning salmon fry to the spawning beds, and then awaiting the return of the fish from the sea was common experience whereby all could agree upon the goals of science education. Story had done what the collective intellect and hours of rhetoric could not, it formed a community with shared experience and common understanding.

Karla, one of our students, summed up the mechanism that helps explain how story builds a sense of community by saying, "Stories offer counsel, comfort, and connection to the lives of others."

The Green Book Revisited.

Reexamine *The Green Book* for a moment. Consider why it lures us to want to know more about the characters, setting and action. What is it about this book that appeals to us? Why was this story so able to communicate important ideas, relationships and universal truth?

If we look at the responses of our learners to this text we see the power of story rehearsed. The story of *The Green Book* helps us remember; it parallels life; it fosters meaning making; it provides a meaningful context; it accommodates individual differences; it invites us into a community.

By reconstructing the story of *The Green Book* learners remember the structure of the story and are immediately able to recall the pieces of information, events, concepts and experiences contained there. The story allows our learners to remember not only the essentials of the story itself, but more importantly allows them to recall why we read the book. They remember that *The Green Book* is a story that helped us to identify why story

was so powerful. Pattie's choice of the blank book to take on the journey at first seemed foolish, yet through this story and her actions we understand otherwise. We remember that the keeping of a community's story, the recording of human events and relationships, the preservation of culture is the essence of *The Green Book*.

The Green Book allows our learners to make meaning through discussion of important conceptual issues. Through Pattie's decision, through the actions and reflections of Father, through the moral dilemmas presented in the conflicts of the colony, we shared and recreated the dilemmas for ourselves. The story facilitated our meaning making of how the world works by paralleling life's nadirs and zeniths.

We learned in a meaningful context. Imagine twenty adults scurrying about building contrivances made of sticks, foil, plastic tape. Their zeal and motivation was created from the context of survival. The story provided that tension and urgency. There was a meaningful context that linked the actions and interests of our learners to something that had purpose and reason.

Each learner approached *The Green Book* from individual perspectives. Some of our younger children were very interested in areas that adults simply skipped over. Some questions adults pursued were eschewed by others. The rainbow context of the story invited a multiplicity of responses and inquiries.

Finally, *The Green Book* helped our learners to form a community. After the shared experience of reading the book, we heard many conversations about possibilities and exploration of meanings. Now, learners can recall experience through the common language of the story. They themselves make story out of their experience.

Students still recall their construction of contrivances, their growing of wheat seeds, the writing in their own blank books. In adding to their own story, they reflect and bring meaning to their experience. Wells (1986, p. 196) emphasized the importance and power of this process. "Making sense of an experience is to a very great extent being able to construct a plausible story about it." Dewey (1938) tells us that the purpose of education is to bring meaning to experience. For real education to occur, we must call on the power of story.

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